DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 2-23-2010 has been entered.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 12-22 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claims 12 defines the reactor as "vertical-type," which is indefinite. See MPEP 2173.05(b)(E), *the addition of the word "type" to an otherwise definite expression extends the scope of the expression so as to render it indefinite.* Dependent claims 13-12 are rejected for their further use of the term "vertical-type" and/or failure to resolve the indefiniteness.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and

> the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. Claim 1, 2, 9-11, 23 and 26 are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent No. 5,061,377 to Lee et al. ("Lee").

7. As to claim 1, Lee teaches a decomposition method comprising:

continuously supplying material to be processed into a reactor through an inlet provided for the reactor **(See Lee col. 5 lines 20-41, aqueous liquid with a substance to be processed is pumped from a source into a pipeline reactor to create a flow)**, whose interior is kept at a sub-critical condition for water **(Lee col. 2 lines 10-15, and see col. 3 lines 20-22, and col. 1 lines 20-25, in which sub-critical temperatures are contemplated)**; and

taking out a liquid containing a decomposition product through any one of a plurality of outlets provided **(See col. 6 lines 5-10)**.

Lee is different from claim 1 in that Lee does not contemplate that the taking out of liquid at any one of the plurality of ports is continuous. But Lee contemplates monitoring additional parameters of the reactor such as temperature and pressure **(See**

col. 6 lines 10-15). A person having ordinary skill in the art at the time of invention would have understood that continuously sampling from the ports would allow continuous monitoring of the reaction. Therefore, a person having ordinary skill in the art at the time of invention would have found it obvious to take off continuous samples from the sampling ports in order to continuously monitor the reaction.

8. As to claim 2, Lee teaches a decomposition method, comprising:

continuously supplying material to be processed into a reactor through an inlet provided for the reactor **(See Lee col. 5 lines 20-41, aqueous liquid with a substance to be processed is pumped from a source into a pipeline reactor to create a flow)**,

taking out a liquid containing a decomposition product through any one of a plurality of outlets provided **(See col. 6 lines 5-10),** to form desired steady concentration profiles of decomposition products in the reactor **(See Lee col. 6 lines 30-40 and col. 45-50, a steady stream of liquid with gas bubbles is produced),** and

taking out the desired decomposition product through at least one of the outlets, the at least one of the outlets being provided at a position where the concentration of the desired decomposition product is high **(See Lee col. 6 lines 5-10, sampling is performed through the sample outlets, and reaction products are removed through 16, the products which are desired to be sampled are drawn off; See also col. 3 lines 40-47)**.

9. As to claims 9 and 23, Lee teaches the method according to claims 1 and 2, respectively, and Lee contemplates water temperatures between 20 and 93 degrees C and also providing gas at 50-105 degrees C **(See Lee col. 1 lines 20-25, and see col.**

3 lines 15-22). Lee also contemplates that the pressure is maintained between 2 and 20 atm **(See Lee col. 10-15)**. Lee explains that the solubility of oxygen in the water is a function of temperature, amount of substances dissolved in the liquid, and pressure **(See Lee col. 10-25, Lee explains that as temperature increases, solubility decreases, but in the table shows that an increase in pressure when temperature increases will increase solubility)**. Therefore, temperature and pressure are result effective variables which control the solubility of oxygen in the liquid to be treated. *Discovery of an optimum value of a result effective variable in known process is ordinarily within the skill in the art and would have been obvious, consult In re Boesch and Slaney (205 USPQ 215 (CCPA 1980)).*

10. As to claims 10 and 26, Lee teaches the method of claims 1 and 2, respectively, and further teaches that the flow is a pulp liquor, which is a byproduct of paper making and therefore a wood and fiber processing waste **(Lee col. 3 lines 1-5)**.

11. As to claim 11, Lee teaches an apparatus comprising:

a reactor **(12)**;

compressing means **(48 and see col. 5 lines 20-25)**;

introducing means **(14 via pump 48)**;

an inlet **(38 is an inlet bend into the reactor zone)**; and

a plurality of outlets provided at respective positions which are different from one another in a flow direction of the water, and which are different from a position at which the inlet is provided **(42, 66 and 70)**.

Lee is different from claim 11, in that Lee does not recite a heating means, *per se*. However, Lee contemplates that the incoming mixture is heated, and provides temperature sensors for the incoming fluid **(See Lee 50 and col. 6 lines 10-15)**. A person having ordinary skill in the art would recognize the use of a heating means to heat the incoming liquid. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to provide a heating means in order to warm the liquid to be treated to a desired incoming temperature.

12. Claims 12, 13, and 16-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 3,322,665 to Chervenak et al ("Chervenak").

13. As to claim 12, Chervenak teaches an apparatus comprising:

a vertical reactor **(64 in Fig. 1, the fractionator is fully capable of performing the functions of a reactor)**,

a heating means **(60)**,

introducing means for introducing the material to be processed into the reactor **(58 through 60 in Fig. 1 is a pipe capable of introducing reactants into the column 64)**;

an outlet **(70, 68, and 66)**,

the reactor is arranged substantially vertically **(See 64 in Fig. 1)**,

the inlet is provided for at least one of a top end portion or bottom end portion **(See in Fig. 1, the inlet is provided at the bottom end portion)**, and

wherein the position of the outlet is adjustable **(See in Fig. 1, the position of the outlet can be at 70, 68, or 66)**.

Chervenak is different from claim 1 in that Chervenak does not clearly recite the use of a compressing means. However, Chervenak shows the use of a pump on the recirculating line **(See Pump P in line 74, and see col. 4 lines 65-68, the feed is pressurized in the line)**. A person having ordinary skill in the art at the time of invention would have known to provide a compressing means in order to pressurize the feed line to a desired pressure. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to provide a compression means in the apparatus of Chervenak in order to pressurize the feed line.

14. As to claim 13, Chervenak teaches the apparatus of claim 12, and further teaches that the outlet is formed as a plurality of positions on a side wall of the column **(See 72, 70, 68, and 66 on 64 in Fig. 1)**.

15. As to claim 16, Chervenak teaches the apparatus of claim 12, but does not mention whether the reactor is cylindrical, the inlet is circular, or whether the inlet had a diameter in a range of 1/5 to 1/15 times the inner diameter of the vertical reactor. However, the selection of a cylindrical shape for the vertical reactor is an obvious selection of shape, which a person having ordinary skill in the art would recognize provides for constant stress around the circumference of the reactor. See MPEP 2144.04(IV)(B). As to a providing a circular inlet, this is also an obvious selection of shape, which a person would have found obvious on connecting a cylindrical supply pipe to the reactor. See again MPEP 2144.04(IV)(B). And providing that the inlet is in a

range of 1/5 time to 1/15 times an inner diameter of the reactor is an obvious selection of relative dimensions, which is not patentably significant unless it is shown that the claimed relative dimensions cause the device to work differently in an unobvious way. See MPEP 2144.04(IV)(A).

16. As to claim 17, Chervenak teaches the apparatus of claim 12, but does not teach a plurality of the vertical-type column reactors. However, providing multiple vertical type reactors would have been an obvious duplication of parts which would allow for accommodating more incoming material, and provide redundancy. See also MPEP 2144.04(VI)(B), *mere duplication of parts has no patentable significance unless new and unexpected results are shown*.

17. As to claim 18, Chervenak teaches the apparatus of claim 12, and teaches a tubular reactor joined to the outlet of the vertical column **(See 24 in Fig 1, 36 is also shown)**.

18. As to claim 19, Chervenak teaches the apparatus of claim 18, and Chervenak provides another tubular reactor, making a plurality **(See 36 in Fig. 1)**.

19. As to claim 20, Chervenak teaches the apparatus of claim 18, and Chervenak provides for a heater **(18)**, and heat exchanger **(34)**, which control the temperature in the reactors **(See 18 on the inlet to 24 and 34 upstream of 36)**.

20. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chervenak in view of Geissbuehler.

21. As to claim 14, Chervenak teach the apparatus of claim 12, but provides multiple outlets for the removal of different products streams, and does not contemplate using using an adjustable height outlet. Geissbuehler teaches using an adjustable height outlet in a vertical column **(See Geissbeuhler abstract and col. 1 lines 54-58)**. Geissbuehler recognizes that an adjustable height outlet allows for adjusting the product discharge **(See Geissbuehler col. 3 lines 10-13)**. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of invention to provide for an axially displaceable outlet in the reactor of Chervenak in order to adjust the product discharge from the column by moving the outlet.

22. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chervenak in view of U.S. Patent No. 3,830,698 to Kleiss ("Kleiss").

23. As to claim 15, Chervenak teaches the apparatus of claim 12, but does not mention the use of monitoring means through which the interior of the column can be visualized. Kleiss teaches the use of multiple thermo sensor in a column **(See 0, 14, 16, and 17 in Fig. 1)**. Kleiss explains that the use of multiple sensors provides for producing temperature gradient signals **(See col. 5 lines 1-10)**. A person having ordinary skill in the art at the time of invention would have had within their skill the ability to convert temperature gradient signals to a visualized representation for monitoring purposes, e.g., by output to a computer monitor. Therefore, it would have been obvious to a person having ordinary skill in the art at the time of invention to provide monitoring

means, such as multiple temperature sensors in order to report a temperature gradient to a computer which is capable of being visualized.

24. Claims 21 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chervenak in view of U.S. Patent No. 3,675,434 to Crawford et al. ("Crawford").

25. As to claims 21 and 22, Chervenak teaches the apparatus of claim 12, but does not mention the use of a back-pressure valve and a cooling pipe immediately before the valve. Crawford teaches the use of column having multiple outlets **(See 56 in Fig. 1)**. Crawford provides for the use of a heat exchanger which cools the product **(See 109)** followed by a pressure reducing valve, which reduces the pressure of the product **(See 112)**. Crawford explains that the use of a heat exchanger followed by the valve cools and depressurizes the product streams from the column **(See col. 8 lines 55-65)**. Therefore, a person having ordinary skill in the art at the time of invention would have found it obvious to provide for a cooling pipe/heat exchanger and a pressure reducing valve on the outlet of the column in Chervenak in order to depressurize and cool the product streams from the outlets.

Allowable Subject Matter

26. Claims 3-8, 24, 25, 27, and 28 are allowed.

27. The following is an examiner's statement of reasons for allowance: U.S. 5,061,377 to Lee et al. ("Lee") is the nearest prior art to claims 3, 4 in that multiple sampling outlets are contemplated along the reactor, and therefore different length flow

paths with different residence times, but Lee does not teach fairly suggest forming a fluidized bed in the flow as required by claims 3 and 4.

28. Upon further consideration and review, the rejection of claims 3 and 4 over Pilz in view of Egan is withdrawn because Pilz does not teach selecting from a plurality of outlets as required by claim 3, or adjusting a distance through which the sub-critical water dissolution part flows in the reactor as required by claim 4. And the combination of Pilz with the multiple outlets of Egan would not have been obvious to a person having ordinary skill in the art as Pilz is a water oxidation reactor whereas Egan is directed to a distillation column.

Response to Arguments

29. Applicant's arguments filed 2-23-10 have been fully considered but they are not persuasive.

30. Applicant's arguments with respect to claims 1,2, 11 and 12 have been considered but are moot in view of the new ground(s) of rejection.

31. With regard to the apparatus claims 11 and 12, applicant is encouraged to define the invention in terms of its structure. "[A]pparatus claims cover what a device *is*, not what a device *does*." *Hewlett-Packard Co. v. Bausch & Lomb Inc.*, 909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990) (emphasis in original). See MPEP 2114.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Lucas Stelling whose telephone number is (571)270-

3725. The examiner can normally be reached on Monday through Thursday 12:00PM to 5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Duane Smith can be reached on 571-272-1166. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Las 5-5-10

/Matthew O Savage/
Primary Examiner, Art Unit 1797